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## Review Papers and Meta-Analyses

### Mindfulness-based stress reduction for medical students: a narrative review

### La réduction du stress basée sur la pleine conscience pour les étudiants en médecine : revue narrative

Emma Polle,<sup>1,2</sup> Jane Gair<sup>1,2</sup>

<sup>1</sup>Island Medical Program, University of Victoria, British Columbia, Canada; <sup>2</sup>MD Undergraduate Program, University of British Columbia, British Columbia, Canada

Correspondence to: Emma Polle, MD; email: [e.polle@alumni.ubc.ca](mailto:e.polle@alumni.ubc.ca)

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#### Abstract

**Background:** Medical students are at high risk of depression, distress and burnout, which may adversely affect patient safety. There has been growing interest in mindfulness in medical education to improve medical student well-being. Mindfulness-based stress reduction (MBSR) is a commonly used, standardized format for teaching mindfulness skills. Previous research has suggested that MBSR may be of particular benefit for medical students. This narrative review aims to further investigate the benefits of MBSR for undergraduate medical students.

**Methods:** A search of the literature was performed using MedLine, Embase, ERIC, PSYCInfo, and CINAHL to identify relevant studies. A total of 102 papers were identified with this search. After review and application of inclusion and exclusion criteria, nine papers were included in the study.

**Results:** MBSR training for medical students was associated with increased measures of psychological well-being and self-compassion, as well as improvements in stress, psychological distress and mood. Evidence for effect on empathy was mixed, and the single paper measuring burnout showed no effect. Two studies identified qualitative themes which provided context for the quantitative results.

**Conclusions:** MBSR benefits medical student well-being and decreases medical student psychological distress and depression.

#### Résumé

**Contexte :** Les risques de dépression, de détresse et d'épuisement professionnel chez les étudiants en médecine sont élevés, ce qui peut nuire à la sécurité des patients. Dans l'éducation médicale, on s'intéresse de plus en plus à la pleine conscience pour améliorer le bien-être des étudiants. La réduction du stress basée sur la pleine conscience (Mindfulness-based stress reduction, MBSR en anglais) est une formule normalisée qu'on utilise couramment pour enseigner les habiletés liées à la pleine conscience. Les recherches montrent que la MBSR peut être particulièrement bénéfique pour les étudiants en médecine. Cette revue narrative vise à examiner plus en détails les avantages de la MBSR pour les étudiants en médecine de premier cycle.

**Méthodes :** Une recherche de la littérature spécialisée a été effectuée à l'aide de MedLine, Embase, ERIC, PSYCInfo et CINAHL pour repérer les études pertinentes. Au total, 102 articles ont été trouvés grâce à cette recherche. Après l'examen et l'application des critères d'inclusion et d'exclusion, neuf articles ont été retenus pour cette étude.

**Résultats :** La formation MBSR a donné lieu à un bien-être psychologique et à une autocompassion accrus chez les étudiants en médecine, ainsi qu'à des améliorations au niveau du stress, de la détresse psychologique et de l'humeur. Les preuves de l'effet de la MBSR sur l'empathie sont mitigées et aucun effet de la méthode n'a été décelé sur l'épuisement professionnel, d'après le seul article qui mesurait ce dernier. Deux études ont défini des thèmes qualitatifs qui ont permis de mettre en contexte les résultats quantitatifs.

**Conclusions :** La MBSR est liée à une amélioration du bien-être et à la réduction de la détresse psychologique et de la dépression chez les étudiants en médecine.

## Introduction

Medical students are at high risk of psychological distress, depression and suicidality.<sup>1,2,3</sup> A 2016 systematic review and meta-analysis of studies from 47 different countries showed a prevalence of depression of 27.2% among undergraduate medical students, 2.2 – 5.2 times higher than the general population.<sup>1</sup> Other studies have shown that nearly half of medical students are suffering from burnout, which correlates with a number of psychiatric comorbidities.<sup>3</sup> In addition to the adverse effects on medical student personal wellness, increased levels of psychiatric distress and burnout in medical students and healthcare providers have been associated with decreased empathy, unprofessional behaviour and patient safety concerns.<sup>4,5,6</sup>

In non-healthcare populations, studies have supported a variety of beneficial effects of mindfulness, including decreased levels of stress, mental distress, depression and anxiety.<sup>7</sup> Mindfulness practices refer to a variety of techniques of mental training that seek to increase attention to the present and promote observation of the self in the present moment.<sup>8</sup> Given the elevated rates of depression and mental distress among medical students, there has been increasing interest in recent years in mindfulness interventions for medical trainees.<sup>9,10</sup> Previous systematic reviews have examined the effects of mindfulness training for medical students and identified possible benefits including decreased stress, anxiety and depression, as well as increased mindfulness and improved mood, self-efficacy and empathy, with mixed effects on burnout.<sup>9,10</sup> There is often wide variability in the mindfulness interventions being included in these reviews, however. Interventions studied in previous reviews included didactic teaching on mindfulness, mindfulness DVD exercises, mind-body skills courses, mindfulness-based stress reduction and audio guided mindfulness activities, among other things.<sup>9,10</sup> In their review on the neuroscience of mindfulness, Tang et al. raised concerns about difficulties comparing findings of mindfulness studies due to differences in mindfulness programs employed across different studies.<sup>11</sup> Given the lack of standardization of mindfulness activities within previous reviews, this literature review will focus on one specific type of intervention, mindfulness-based stress reduction (MBSR).

MBSR refers to a standardized way of teaching mindfulness and meditation which was created in the late 1970s based

on Buddhist techniques to develop mindful and nonjudgmental awareness.<sup>12</sup> MBSR is a well-established, structured format for teaching mindfulness.<sup>13</sup> Although variability can reasonably be expected with the implementation of any given MBSR program, the core elements and basic structure should remain similar. The classic course was developed as an eight week program with two hour sessions each week, combined with daily home practice and a one day retreat.<sup>13</sup> In addition to being a more standardized intervention, MBSR is of particular interest in healthcare trainees because a previous meta-analysis of MBSR for healthy people identified that healthcare professionals appeared to benefit from the MBSR program more than the average healthy population.<sup>7</sup> In addition, one previous systematic review looking at many types of mindfulness interventions for medical students suggested that the MBSR program might be more effective than mindful meditation by itself for improving their psychological well-being.<sup>9</sup> This review aims to further investigate the benefits of MBSR for medical students.

## Methods

A search of the literature was performed using MedLine, Embase, ERIC, PSYCInfo, and CINAHL databases for articles published up to March 12, 2019. Keywords were combinations of: mindfulness-based stress reduction, MBSR, medical education and medical students. A total of 102 papers were identified with this search.

The following inclusion criteria were used: 1) Study population included undergraduate medical students. 2) The intervention was an MBSR program, including the Stress Reduction & Relaxation Program (SR & RP - an early version of the program which has now become known as MBSR<sup>14</sup>). 3) Published in peer-reviewed journals. Articles not published in English were excluded from this review.

Articles were initially screened by title and abstract. Papers deemed potentially relevant based on this preliminary screen were then fully reviewed by one reviewer for consideration. Upon review of the 102 papers identified with the search criteria, 37 papers were found to be redundant and 56 were excluded based on the predetermined inclusion and exclusion criteria. This left nine papers which were included in the study.

## Results

This review examined nine articles studying the effects of MBSR for medical students. Study characteristics and results are summarized in Table 1. Outcomes measured

varied widely between studies, but generally studies demonstrated beneficial effects of MBSR for medical students, including improving medical student mood and decreasing psychological distress.<sup>16,18,20,21,23</sup> De Vibe et al. looked directly at self-reported subjective well-being, and found a significant increase following MBSR with a preserved effect at six year follow-up.<sup>16,18</sup> Similarly, Van Dijk et al. found increased positive mental health and life satisfaction following MBSR, again consistent at 20-week follow-up.<sup>23</sup> Erogul et al. measured self-compassion using the Self-Compassion Scale, which has been associated with positive psychological health and also found significant increases post-intervention and at six month follow-up.<sup>19</sup> Of three studies that examined medical student psychological distress, all found decreased levels of overall psychological distress immediately following MBSR programs.<sup>16,21,23</sup> Both studies looking at stress levels also found decreased perceived stress levels immediately following MBSR training.<sup>18,19</sup> Shapiro et al. showed significant reduction in self-reported depression with Stress Reduction and Relaxation Program (SR & RP, an early form of MBSR).<sup>21</sup> Rosenzweig found significantly lower total mood disturbance following MBSR compared to control.<sup>20</sup> Two studies identified qualitative themes which provided context for the quantitative results and explored student experiences with MBSR training.<sup>15,22</sup>

## Discussion

Multiple studies looking at positive mental health outcomes showed statistically significant increases in measures of psychological well-being which were preserved at longitudinal follow-up. Positive effects on mood were consistent among the two studies examining mood and depression.<sup>20,21</sup> Of note, Rosenzweig found statistically significantly lower total mood disturbance following MBSR compared to controls, despite the MBSR group starting with a higher baseline total mood disturbance.<sup>20</sup> The findings of lower depression and lower mood disturbance rates among medical students participating in MBSR are similar to the findings of systematic reviews of MBSR in healthy people demonstrating that MBSR can reduce stress, depression, anxiety and distress.<sup>7</sup> This demonstrates that these effects are also present in medical student populations who experience higher than average levels of stress, depression and psychological distress.<sup>1,2</sup>

Studies also showed improvements in negative psychological states of stress, psychological distress and

mood. Although the overall magnitude of the effect on psychological distress noted by Van Dijk et al. was small, this effect was preserved at 20-month follow-up.<sup>23</sup> In longitudinal follow-up, Erogul et al. found that their results remained trended towards decreased perceived stress after six months, although this was not statistically significant. Correspondingly, in their qualitative thematic analysis, Aherne et al. found that stress management was one reason students identified for satisfaction with the MBSR course.<sup>15,19</sup> These findings highlight the importance of MBSR effects on stress management for medical students and the possibility of a sustained benefit following a brief MBSR intervention.

Interestingly, the only study examining burnout showed no significant improvement with MBSR training.<sup>16</sup> Although limited conclusions can be drawn from a single study, this is consistent with the findings of a previous systematic review of mindfulness interventions for medical students.<sup>10</sup> Daya et al. theorize that this lack of effect in initial studies of MBSR training may be because burnout is perhaps a later result of stress and depression, and therefore stress and depression may be the first variables to show effects in studies.<sup>10</sup> The study included in this review that looked at burnout did not include any longitudinal follow-up on burnout levels to assess for improvements remote from the MBSR training.<sup>16</sup> Further research is needed in this area, as burnout is an important outcome to investigate given its links to professional behaviour, empathy and patient safety.<sup>4,5,6</sup>

Evidence for effect on medical student empathy was mixed. In quantitative studies, Shapiro et al. demonstrated an increase in empathy,<sup>21</sup> but Van Dijk et al. failed to show any improvement in empathy post-intervention or at 20-month follow-up.<sup>23</sup> In their qualitative study, Solhaug et al. found that students participating in MBSR described patient encounters where they were able to have more compassion towards patients by employing MBSR techniques.<sup>22</sup> They suggest that one possible mechanism for these changes is that MBSR training helps students remain present with patients despite difficult emotions or experiences.<sup>22</sup> The mixed results in this review are in keeping with the findings of Lamothe et al. in their systematic review of MBSR for healthcare providers. They found that although improvements in empathy are suggested, the evidence remains unclear and further studies will be required to delineate these effects.<sup>24</sup>

Table 1. Study characteristics and findings

Study	Population	Design	Intervention	Outcomes Measured	Results	Comments
Aherne et al. <sup>15</sup>	Year 1 and Year 2 Medical Students (n = 140 Year 1, n = 88 Year 2)	Mixed method pre- and post- study, with qualitative thematic analysis (no control group)	Seven week MBSR course: Compulsory for Year 1, Optional for Year 2	Satisfaction Qualitative thematic analysis	High satisfaction with MBSR training in optional Year 2 group Themes identified: great concept, poorly executed, satisfaction with course, less discussion, more practice, importance of session environment and considering individual preferences	No control group Although same course content, Year 2 students had a longer course than Year 1 students, and Year 2 students had previous experience with mindfulness
De Vibe et al. <sup>16</sup>	288 second and third term psychology and medical students (144 control, 144 intervention)	Randomized controlled trial	Seven week MBSR program	Mental distress Study stress Student burnout Subjective well-being Mindfulness Student compliance	Decrease in mental distress and perceived medical school stress Increased subjective well-being Gender difference in MBSR effect favouring women No significant effect on burnout MBSR enhanced problem-focused coping	Intervention group had more female participants than control (118 vs 101)
Halland et al. <sup>17</sup>	288 second and third term psychology and medical students (144 control, 144 intervention)	Randomized controlled trial	Seven week MBSR program	Coping strategies and personality factors	Specifically for students with high levels of neuroticism, it was associated with decreased avoidance-focused coping and increased seeking of social support Increased subjective wellbeing at six year follow-up after MBSR	Same study population and intervention as de Vibe et al. <sup>16</sup>
De Vibe et al. <sup>18</sup>	288 second and third term psychology and medical students (144 control, 144 intervention)	Randomized controlled trial, six year follow-up	Seven-week MBSR intervention with booster sessions twice yearly	Subjective wellbeing Dispositional mindfulness Coping	Greater increases in the trajectories of dispositional mindfulness and problem-focused coping, and decreases in avoidance-focused coping Significant decrease in perceived stress at eight weeks, but not at six months poststudy.	Longitudinal follow-up on de Vibe et al. <sup>16</sup> study
Erogul et al. <sup>19</sup>	First year medical students (29 intervention, 30 control)	Unblinded, randomized controlled trial	Eight-week MBSR intervention (75 minute weekly classes with homework) and full-day retreat	Stress Self-compassion Resilience	Significant increase in self-compassion scores at conclusion of study and six months poststudy No significant change in resilience scores	

Rosenzweig et al. <sup>20</sup>	Second year medical students (140 intervention, 162 control)	Prospective, nonrandomized, cohort-controlled study	10-week MBSR program	Mood state	Baseline total mood disturbance was significantly lower in MBSR group vs controls after MBSR training, despite being greater in the MBSR group compared with controls prior to the intervention Significant effects observed on tension-anxiety, confusion-bewilderment, fatigue-inertia, vigor-activity subscales	
Shapiro et al. <sup>21</sup>	Premedical ( $n = 35$ ) and 1 <sup>st</sup> and 2 <sup>nd</sup> year medical students ( $n = 38$ )	Matched randomization experiment (assigned to mindfulness-based intervention group or waitlist control group)	Seven-week mindfulness-based intervention modeled after Kabat-Zinn's Stress Reduction & Relaxation Program (early version of MBSR)	Empathy Psychological Distress Depression State and Trait Anxiety Spirituality	Reduction in self-reports of overall psychological distress, depression, state and trait anxiety Increased empathy levels, spiritual experiences	Compliance was important in outcome
Solhaug et al. <sup>22</sup>	11 first and second year medical and 11 first- and second-year psychology students	Qualitative study – focus groups or in-depth interviews	Seven-week MBSR	Phenomenological analysis of interview transcripts	Increased attention and awareness of psychological and bodily phenomena Decreased reactivity, increased curiosity, affect tolerance, patience, self-acceptance, improved relational qualities Focused on attentional elements rather than attitudinal Small reduction in psychological distress Higher positive mental health, higher life satisfaction, more mindfulness skills	Subset of study population from de Vibe et al. <sup>16</sup>
Van Dijk et al. <sup>23</sup>	Clerkship students (83 intervention, 84 control)	Cluster-randomised controlled trial with follow-up at 20 months	Eight-week MBSR (Two-hour weekly sessions)	Psychological distress Positive mental health Life satisfaction Mindfulness skills Physician empathy Dysfunctional cognitions	Decreased dysfunctional cognition No difference in empathy Improvements consistent at 20 month follow-up period	

## Limitations

One limitation of this review is that four of the studies were studying the same group of participants or subsets of this group who received the same MBSR intervention. As such, the results of this review may be more heavily influenced by the quality of this particular intervention. Study design of the reviewed studies is another limitation noted in this review. First, there was a marked absence of active control groups. Most control groups received no intervention while the other group received MBSR training.<sup>15,16,17,18,19,21,23</sup> As discussed by Tang et al, lack of active control in mindfulness research fails to account for the potential effects of social connection, time spent in home practice and psychoeducation that may be providing effects distinct from any effect of the MBSR content itself.<sup>[11]</sup> Second, there were opportunities for selection bias in the students who participated in most of the studies, despite the use of randomization in the majority of the studies. As de Vibe et al. note, less than half of students who were eligible to participate in their study volunteered, and those who volunteered may represent a group of individuals more motivated to focus on psychological and personal issues.<sup>16</sup> As such, the generalizability of these findings to all medical students is in question. This is supported by the findings of Aherne et al. that MBSR was significantly more satisfactory for medical students participating in the course on an optional basis rather than compulsory.<sup>15</sup> Future research will be needed to determine if the effects seen are generalizable to all medical students or if there are subsets of the medical student population that benefit the most.

Another factor to consider is the heterogeneity in outcomes assessed. While most articles examined similar themes of psychological well-being, stress, and depression, the actual outcomes measured varied and even when similar outcomes were being measured, different scales were used.

Differences between the MBSR programs used also limit this review. Although MBSR is considered a standardized program for teaching mindfulness,<sup>13</sup> MBSR interventions in the studies reviewed varied from seven to 10 weeks, employed varying amounts of daily recommended home mindfulness practice and not all included a day-long retreat.<sup>15-23</sup> While the core content is assumed to be similar, it is possible that differences in the implementation of the MBSR program led to variability in results.

## Conclusion

This review highlights the potential for MBSR interventions to improve the psychological well-being of medical student populations. MBSR training was associated with improvements in medical student stress, mood, and psychological distress as well as increases in measures of mental well-being. Evidence for associations between MBSR and empathy and burnout was unclear. Medical students are at high risk of negative psychological outcomes which can also affect patient care, and MBSR appears to be a valuable intervention in this population.

Future work should use study designs that minimize selection bias to clarify whether these effects are truly generalizable to all medical student populations or just to those who choose to participate in MBSR on an optional basis. Further studies using active controls will also be important to separate the effect of MBSR program content from any effect of the program format. Given the effect of burnout on patient outcomes and medical student well-being, more research is needed to clarify any role of MBSR training in affecting burnout rates.

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